

MAGNETIC FIELD PROTECTION FOR THE PROJECTILE  
OF AN ELECTROMAGNETIC COIL GUN SYSTEM

ABSTRACT OF THE DISCLOSURE

5       An electromagnetic coil gun system includes a launcher having a barrel  
with a longitudinal bore therethrough, and a plurality of longitudinally extending  
electrical excitation coils arranged circumferentially around the bore of the barrel  
so that a magnetic field produced by an electrical current in each electrical  
excitation coil penetrates into the bore. Each electrical excitation coil is  
independently activated by the electrical current passed therethrough. There is a  
10   projectile sized to be received within the bore of the barrel and having a  
circumferential armature at a tail end thereof, and a nose end. The projectile  
placed into the bore is fired by producing a traveling sequence of propulsive  
currents in the electrical excitation coils moving in a direction from the breech end  
toward the muzzle end of the barrel, so that a traveling propulsive magnetic field  
15   produced by the electrical excitation coils interacts with the armature of the  
projectile to propel the projectile in the direction from the breech end toward the  
muzzle end of the barrel. Simultaneously, a traveling sequence of field-nulling  
currents in the electrical excitation coils moves in the direction from the breech  
end toward the muzzle end of the barrel but closer to the muzzle end of the barrel  
20   than the traveling sequence of propulsive currents and spatially leading the  
traveling sequence of propulsive currents. The field-nulling currents are in a  
circumferential direction opposite to the propulsive currents, thereby at least  
partially nulling the traveling propulsive magnetic field at the nose end of the  
projectile.